YEAR 2000
ANNUAL OCEAN COUNT RESULTS

Daniela Maldini
Department of Zoology
Ecology, Evolution, and Conservation Biology Program
Hawai'i Institute of Marine Biology
P.O. Box 1346
Kaneohe, HI 96744

April 2000

Report prepared under Contract #40ABNC050729 from the Hawaiian Islands Humpback Whale National Marine Sanctuary, Kīhei, HI to the Marine Option Program, University of Hawai'i at Manoa

INTRODUCTION

The Hawaiian Islands Humpback Whale National Marine Sanctuary (HIHWNMS) was designated by Congress in 1992 in recognition of the importance of Hawai'i's near-shore waters to breeding humpback whales. The Sanctuary's overall mission is therefore the protection of humpback whales and their habitat within Sanctuary waters. There are several aspects to the fulfillment of this goal. Of primary importance is the education of the people of Hawaii by furthering their understanding of the relationship between humpback whales and the Hawaiian Islands marine environment. An educated Hawaiian public would be empowered with the ability to make better decisions about the future of their island home and to have a direct input into the management of human uses of the Sanctuary.

Many other species of cetacean frequent Hawai'i's waters, some being permanent year-round residents of inshore and offshore waters. Of these 23 species, only the spinner dolphin matches the humpback whale in notoriety. The remaining species are little known and many Hawai'i residents are not even aware of their presence in island waters. This is an additional reason for continuing to educate the public about Hawai'i's marine resources.

To fulfill the Sanctuary's educational goals, staff and volunteers have worked together to promote events that would encourage public participation in both scientific and conservation efforts focused on humpback whales. The continued protection of humpback whales and their habitats is, in fact, crucial to the long-term recovery of this endangered species.

Between January and April, the warm, shallow waters surrounding the main Hawaiian Islands become one of the world's most important humpback whale habitats as well as one of the only places in the U.S. where these animals reproduce. Up to two-thirds of the entire North Pacific humpback whale population (approximately 2,000-3,000 whales) may migrate to Hawai'i during this period to engage in breeding, calving and nursing activities.

In occasion of this conspicuous and popular humpback whale migration to Hawaiian waters, the Hawaiian Islands Humpback Whale National Marine Sanctuary has been organizing educational events that have attracted massive public participation both on the Island of O'ahu and Hawai'i. The most popular of these events has been the Annual Ocean Count. Over 300 volunteers on the Island of O'ahu, and a similar number on the Island of Hawai'i annually spend a few hours at pre-designated sites along the shoreline and document the number of humpback whales and other marine mammals present offshore. Volunteers are pre-trained in the data collection procedures and a site coordinator monitors their work in the field. Data collected during the ocean count are first screened for consistency and then entered into a database for further analysis. The following report is an evaluation of the year 2000 Ocean Count effort.

ISLAND OF O'AHU

SITES AND PARTICIPATION

Over 600 volunteers participated in the 2000 Ocean Count on O'ahu on 27 February 2000. Results were received from 40 sites around the island (Table 1). Data sheets included 40 Counts. Most of the excluded data sheets were not used because they did not report Pod Identification number. This is a necessary piece of

information to determine whether the observer was seeing the same pod over and over or different pods. Some data sheets were excluded because volunteers did not remain at the site for the entire observation time, therefore potentially seeing less whales and biasing results low.

Table 1 – Summary of the number of volunteers at each site, and number of data sheets collected versus utilized

	Site Name	Participants	Tot DSH	Complete Data Sheets
1	ʻEwa Beach	17	-	-
2	Koʻolina	11	1	1
3	Barber's Point	7	-	-
4	Nānākuli Beach Park		3	3
5	Māʻili Point	14	4	3
6	Pōkaʻī Bay	24		
7	Lahilahi Point	4		
8	Kea'au Beach Park	8	1	1
9	Mākua Cave	9	10	7
10	Kaʻena Point (W. Shore)	20	7	2
11	Kaʻena Point (N. Shore)	15	4	1
12	Mokulēʻia Beach Park	29	4	4
13	Puaʻena	8	1	1
14	Waimea Bay	3	2	2
15	Shark's Cove	4	4	4
16	Sunset Beach	3	3	3
17	Turtle Bay	16	1	1
18	Mālaekahana	1	-	-
19	Lāʻie point	15	5	2
20	Hauʻula	3	2	1
21	Kualoa	18	3	2
22	Pyramid Rock	3	1	1
23	Mōkapu Point	1	1	1
24	Lanikai	3	3	2
26	Makapuʻu Point	13	12	7
27	Makapuʻu Lighthouse	11	8	7
28	Hālona Blowhole	17	15	6
29	Lānaʻi Lookout	20	11	3
30	Hanauma Bay	15	10	6
32	Black Point	20	0	0
33	Diamond Head	33	20	15
34	Magic Island	11	11	9
35	Waialae Iki Ridge	4	1	1
38	Kakaʻako Beack Park	9	5	1
	TOTAL	**308**	**108**	**64**

METHODS OF DATA ANALYSIS

Data Collection

Observers were located at 32 sites around the Island of Oʻahu between 0900 and 1200 on February 27 2000. Every time a humpback whale or any other marine mammal was spotted, each observer wrote down time, species identity, number of animals seen, estimated distance of the sighting from the observer, direction of the sighting (N, S, E, W), behavior exhibited by the animal, direction of travel if the animal was moving, and level of confidence of the observer that the observation was accurate (expressed as low, medium or high). For each sighting the observer assigned a Pod Identification Number (POI). If the same pod was spotted over and over, the POI assigned for that sighting was the same. At the end of the observation period, a site coordinator collected all data sheets and turned them in to the HIHWNMS for analysis.

Data Processing

Data were checked for consistency and for appropriate methodology. From the selected sheets for each site, a summary database was compiled, reporting all unique sightings of humpback whales and of other marine mammals.

To determine how many whales were seen on average at each site, information about number of pods seen by each observer and maximum number of whales seen per pod per observer was compiled from the database (Table 2).

Sites were pooled based on location around Oʻahu into four main areas: south shore (from Barber's Point to Makapuʻu Point), Windward Coast (from Makapuʻu Point to Kahuku Point), North Shore (from Kahuku Point to Kaʻena Point), and Waiʻanae Coast (from Kaʻena Point to Barber's Point). Average number of whales seen for each side of the island was obtained by pooling all acceptable counts at all sites in that area.

RESULTS

Data were obtained from 32 sites around Oʻahu. Many of the data sheets were incomplete, and 50 could not be used because they did not report POD ID number therefore making it impossible to determine whether the observer was looking at the same whale over and over or at different whales. Six data sheets reported only one line while other observers saw many whales. In this case it was difficult to determine if the observer was recording throughout the observation period. Generally, such data sheets introduced variability in the counts at a site.

Four sites reported no whales while volunteers located at all other sites saw at least one pod. Between 100 and 188 pods were observed for a total of 178 to 325 whales (Table 2). Average number of whales at each site had a high standard deviation for sites with multiple observers (Fig. 1). The highest count was reported at Shark's Cove on the North Shore (23 to 40 whales). Māʻili Point on the Waiʻanae coast and Makapuʻu Lighthouse between the south shore and the windward coast were second with comparable number of whales (Table 2). Sites with high or moderately high counts had also a high standard deviation, indicating an uneven effort among observers.

Nine sites were located along the South Shore, 6 along the Waiʻanae coast, 6 along the North Shore, and 11 along the Windward coast. Most whales were seen along the Windward coast of Oʻahu, with pockets of abundance at the points around the Island. The

North Shore also had a high number of sightings. The south shore and the Waiʻanae coast were comparable.

Table 2 – Summary of humpback whale sightings reported for each site

Site #	Site Name	Number of Pods	Number of Whales	Average Whales
1	ʻEwa Beach	0	0	0
2	Ko ʻOlina	1	2	2
3	Barber's Point	0	0	0
4	Nānākuli Beach Park	1-5	1-6	3 ± 3
5	Māʻili Point	5-9	9-23	18 ± 8
8	Kea'au Beach Park	2	2	2
9	Mākua Cave	6-10	9-16	13 ± 3
10	Ka'ena Point	2-8	4-13	9 ± 3
11	Ka'ena Point	3-9	11-13	11 ± 2
12	Mokule'ia Beach Park	5-7	6-11	9 ± 2
13	Pua'ena	5	10	10
14	Waimea Bay	5	6-8	7 ± 1
15	Shark's Cove	10-17	23-40	32 ± 11
16	Sunset Beach	3-8	8-15	11 ± 4
17	Turtle Bay	5	7	7
18	Mālaekahana	0	0	0
19	Lāʻie Point	2-7	3-10	9 ± 1
20	Hauʻula	2-3	3	3
21	Kualoa	7	11	11
22	Pyramid Rock	4	6	6
23	Mōkapu Point	2	3	3
24	Lanikai	1-3	2-4	3 ± 1
26	Makapu'u Point	2-7	2-18	7 ± 5
27	Makapu'u Lighthouse	5-13	9-26	18 ± 6
28	Hālona Blowhole	5-11	6-13	11 ± 3
29	Lānaʻi Lookout	5-9	8-10	10 ± 3
30	Hanauma Bay	1-7	12	5 ± 4
32	Black Point	0	0	0
33	Diamond Head	1-4	1-6	3 ± 1
34	Magic Island	1-11	1-24	8 ± 9
35	Waialae Iki Ridge	8	11	11
38	Kakaʻako Beach Park	1	2	2

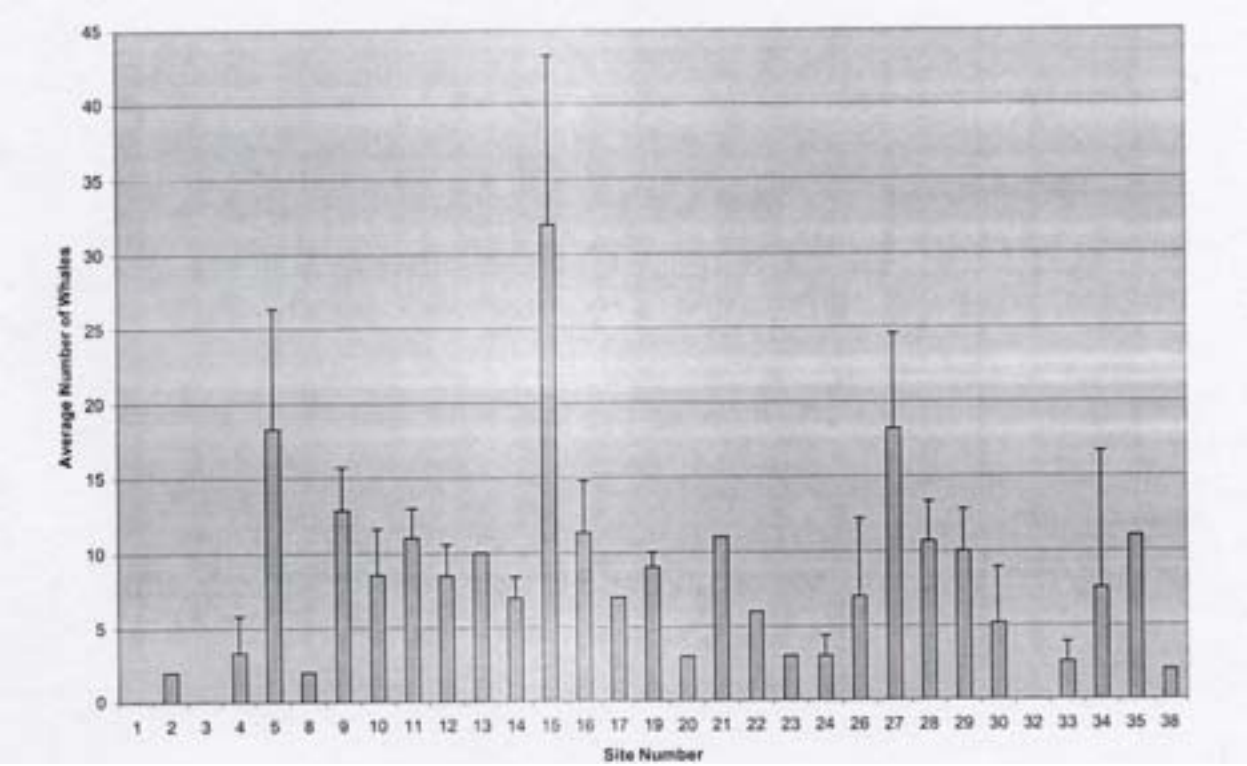

Fig. 1 – Average number of humpback whales (+ S.D.) observed between 0900 and 1200 at 32 coastal sites around the Island of O‘ahu on 27 February 2000.

Table 3 – Minimum and maximum number of whales observed along the four coastlines of O‘ahu, and sites where the highest number of whales was seen.

Location	**Number of Sites**	**Min Whales**	**Max Whales**	**Best Site**
South Shore	9	35	65	Hālona Blowhole
Waianae Coast	6	34	62	Mā‘ili Point
North Shore	6	57	97	Shark’s Cove
Windward Coast	11	52	101	Makapu‘u’s Lighthouse

Seven sightings of other marine mammals occurred (Table 4). Four were reported as unidentified dolphins, one as bottlenose dolphins (*Tursiops truncatus*) and spinner dolphin (*Stenella longirostris*), two were unanimously reported as spinner dolphins. Given their proximity to shore, and the reported behaviors, it is likely that all these sightings were of spinner dolphins. Group size varied among observers.

Table 4 – Summary of dolphin sightings. SD = Spinner Dolphin, UD = Unidentified Dolphin, BD = Bottlenose Dolphin.

Site #	Site Name	Species	Group Size
4	Nānākuli Beach Park	SD/BD	6-7
8	Keaʻau Beach Park	UD	6
9	Mākua Cave	SD/UD	7-50
10	Kaʻena Point	SD	20
15	Shark's Cove	SD	4
27	Makapuʻu Lighthouse	UD	5
33	Diamond Head	UD	1

DISCUSSION AND RECOMMENDATIONS FOR NEXT YEAR'S COUNT

The most striking feature of the data is the high variability in counts among observers at the same site, in particular for sites where higher number of whales were reported. This possibly stems from the difficulty experienced by relatively inexperienced volunteers in determining whether they were recounting animals or seeing new ones throughout the observation period. For some sites this problem may have been compounded by the fact that whales were surface active and therefore distracting attention from other more cryptic animals.

Although sighting effort was allocated almost evenly around the island, the different elevation of the sites and the different number of observers at each site may have biased the results since the area of ocean covered at each site was unknown and larger at some sites that others. For this reason it is difficult to standardize the data and perform accurate comparisons.

To lower the incidence of bad data it is important that each observer is carefully trained. Several of the observers did not attend the training meeting and were trained on site before the start of the count. Training is particularly important for site leaders. Several site leaders appeared confused and reported having too many volunteers at the site.

I suggest that no volunteer that did not attend the training meeting should be allowed to be in charge of a data sheet to avoid misinterpretation of the information requested. It would also be preferable to have only one data sheet turned in for each site, completed and reviewed by the site leader. It also would be useful to have additional information about the circumstances of each sighting, the problems experienced at the site and as much information as possible about the observation period. It is extremely difficult to otherwise interpret the data provided, especially when patchy.

The current format for data collection is probably not data efficient. Most of the information provided in the data sheet was not useful. In particular, behavioral data were difficult to interpret because observers misinterpreted the definition of the various behavioral states. For example, animal behavior was frequently reported as "blow" by the observers. This does indicate the animal is at the surface, but does not give any information about the behavioral state of that animal such as whether it is traveling, stationary, or taking a break between bouts of surface activity. Counting blows would only be useful if an animal was followed for a period of time so that dive intervals could be estimated. Otherwise, it is hard to determine how many blows for that animal an observer missed while looking at other whales in the surrounding area.

The misinterpretation of the behavioral definitions may have been caused by the change in procedures implemented for this year's count. Additional training for site leaders is therefore recommended if accurate behavioral data needs to be collected.

Distance estimation seemed to be very difficult for most observers. At some sites, site leaders were very unclear about this task and misled the observers. One site in particular reported distances of over 20 miles from shore, which is unlikely even if the site was elevated. It is like saying that you can see a whale stranded on the island of Moloka'i, located 26 miles from across the Ka'iwi Channel, from the observation point. Another highly critical issue is the number of calves observed, which was probably lower than expected because observers seemed to have difficulty recognizing the presence of a calf.

It is important that each site adopts a consistent method of collecting information, and that the site leader describes how volunteers were positioned at each site. It is otherwise impossible to know if, at certain sites, volunteers were looking in different areas and therefore seeing different whales, while, at other sites, everybody was looking in the same general area.

I suggest completely revising the way data are collected to provide a more accurate estimate of the whales present by doing an hourly point count (at 0900, 1000, 1100 and 1200, Fig. 2), and in between doing a "focal follow" for a randomly chosen animal (Fig. 3) so that more accurate behavioral and dive time information can be obtained. Only one data sheet per site would be required for the point count, while two or three focal follows could be completed per site. The site leader should supervise data collection and transcribe the data before turning it in.

The second phase of the data analysis consists in entering sightings into a geographic information system database and integrating them with data from the previous years. This second phase of the project is being implemented.

Following is a brief summary of site leaders' reports for sites where comments were available:

Site 1 – 'Ewa Beach (South Shore)

No whales were sighted at Ewa Beach. The site has no elevation, and this may have affected visibility at a distance.

Site 2 – Ko 'Olina (Waianae Coast)

This site was on top of the Ihilani Resort roof, therefore affording excellent visibility. Only one whale was sighted and was reported to be a calf. Because it is frequent that calves spend time at the surface while the mother is underwater, the presence of the mother was inferred.

Site 3 – Barber's Point (South Shore)

No whales were sighted. This location was at sea level and visibility may have been diminished.

Site 4 – Nānākuli Beach Park (Wai'anae Coast)

Observers reported 4 whales: dolphins (six animals in total) surrounded one whale, one was a solitary whale and two whales were a mother/calf pair. The tally on the data sheets varied from 1 to 6 whales depending on the observer. Observers felt they underestimated the distance to the animals.

The dolphins observed surrounding one of the whales were reported as bottlenose dolphins, but they were seen spinning, which is a behavior unique to spinner dolphins. For this reason the animals were classified as spinners.

Site 5 – Māʻili Point – Oʻahu Civil Defense Site (Waiʻanae Coast)

The observers reported much boat activity at the site, with the boat "Rainbow Runner I" close to some whales, some fishing boats and a submarine. Observers also reported having a hard time keeping track of which whale was which because of heavy surface activity, especially in proximity of the whale watching vessels. The tally of the sightings totaled between 9 and 23 whales (18 ± 8 on average), which represents a high variability among the 3 observers. Of the whales sighted 2 to 6 were reported as calves.

Site 8 – Kea'au Beach Park (Waiʻanae Coast)

One whale was sighted travelling approximately 3 miles form shore. A group of 6+ dolphins (likely spinner dolphins) was sighted 200 yards from the beach.

Site 9 – Mākua Cave (Waiʻanae Coast)

The total number of whales reported by the observers in the summary sheet was higher than the number of whales reported in the data sheets. This site experienced medium boat traffic. Observers reported difficulty judging distances.

Site 10 – Ka'ena Point (Waiʻanae Coast)

Approximately 40-60 spinner dolphins were sighted at this site. Data sheets report a maximum of 30 animals. The whale count averaged 9 animals.

Site 11 – Ka'ena Point (North Shore)

Windy most of the time. Lots of surface activity.

Site 12 – Mokuleʻia Beach Park (North Shore)

Weather was overcast. Light boat traffic. Beaufort between 2 and 4. Lots of surface activity.

Site 14 – Waimea Bay (North Shore)

One pod was followed closely by two fishing boats. The whales were travelling to get away from the boat. Very little variability between two observers. Average 7 whales.

Site 15 – Shark's Cove (North Shore)

Distances were probably misjudged at this site because all observers reported seeing animals 15-20 miles from shore. There was some surface activity in the pods. A school of unidentified dolphins was sighted.

Site 17 – Turtle Bay (North Shore)

The site was very windy, and observers reported high waves and white caps, which certainly reduced visibility at this site. Whales were seen only when breaching or fluke-up diving.

Site 18 – Malaekahana (Windward Coast)

This site was windy and no whales were sighted.

Site 19 – La'ie Point (Windward Coast)

Windy. Observers reported 9-10 whales. The activity was observed early in the morning when a pod of about 8 whales moved through the area.

Site 23 – Mōkapu Point (Windward Coast)

Very windy. White caps.

Site 26 – Makapu'u Lookout (Windward Coast)

Waves and white caps made viewing difficult. Observers reported having difficulties judging distances.

Site 38 – Kaka'ako Beach Park (South Shore)

One whale was observed throughout the observation period. It was located SE of the site in front of Kewalo Basin boat harbor. The whale dove for approximately 15-minute intervals, surfaced for 6-7 shallow blows, then fluked up and disappeared. The animal never moved from its location. At 10:30, this animal was joined by a second whale, which was observed only for one surfacing interval. It was unclear if the animal was present previous to this first sighting. Both whales were surrounded by whale watching vessels at all times.

ISLAND OF HAWAI'I

SITES AND PARTICIPATION

The Big Island Ocean Count was organized and directed by Lisa Diaz on February 26th 2000 and March 11th 2000. There is no information on number of participants for either count. On February 26th, 18 sites around the island recruited volunteers for the count.

RESULTS

Data for February 26th are reported for 15 sites (3 sites were not reported). Data sheets for these data were not available for analysis so the numbers reported reflect total counts as entered by Lisa Diaz in a comprehensive tally sheet. Data were divided into three sighting periods (0900-1000, 1000-1100, and 1100-1200; Table 1).

Table 1 – Result summary for the 2000 Big Island Ocean Count as reported by Lisa Diaz.

Sighting Period	**Number of Humpbacks**	**Other Marine Animals**
0900-1000	113	90 spinner dolphins 5 bottlenose dolphins
1000-1100	99	60 spinner dolphins 1 green sea turtle
1100-1200	124	60-100 spinner dolphin

Fig. 2 - POINT COUNT SHEET

Date _____ Site # _____ Site Name _____

Site Leader _____ Phone # _____ - _____

Observe area for 15 minutes then tally all observations:

Time	Species	Adults	Calves	Comments
0900	Humpback Whales			

Time	Species	Adults	Calves	Comments
1000	Humpback Whales			

Time	Species	Adults	Calves	Comments
1100	Humpback Whales			

Time	Species	Adults	Calves	Comments
1200	Humpback Whales			

Fig. 3 - FOCAL FOLLOW SHEET

Date _____ Site # _____ Site Name _____

Observer _____ **Phone #** _____ - _____

Species: Humpback Whale
Group composition at the beginning of observation period: Adults: _____ Calves: _____
Follow only one animal or one pod for as long as possible.

Observation Number (Sequential)	Time	Number Of Animals	Number Of Adults	Number Of Calves	POD Or School ID	Distance From Observer (In Miles)	Sighting Angle (0° to 180°)	Direction Of Movement (0° to 360°)	Observer's Confidence Level (H, M, L)	Behavioral Events

Report every blow and behavioral events between blow.